

#### ABSTRACT OF THE DISCLOSURE

A method for combusting a fuel in a cyclone combustor having a burner and a barrel includes: feeding a stream of the fuel into the barrel at the burner end of the barrel; feeding a stream(s) of a first oxidant (e.g., air) having a first oxygen concentration into the barrel at a first flowrate, the stream(s) of the first oxidant including a predominant stream; feeding a stream(s) of a second oxidant (e.g., oxygen) having a second oxygen concentration into the barrel at a second flowrate and in a selective manner, whereby a portion of the first oxidant combines with a portion of the second oxidant, thereby forming a combined oxidant having a combined oxygen concentration, and a portion of the first oxidant from the predominant stream continues having the first oxygen concentration; and combusting a portion of the fuel with a portion of the combined oxidant in the barrel.